Cosmology and Low-energy Astrophysics with gamma-ray observations

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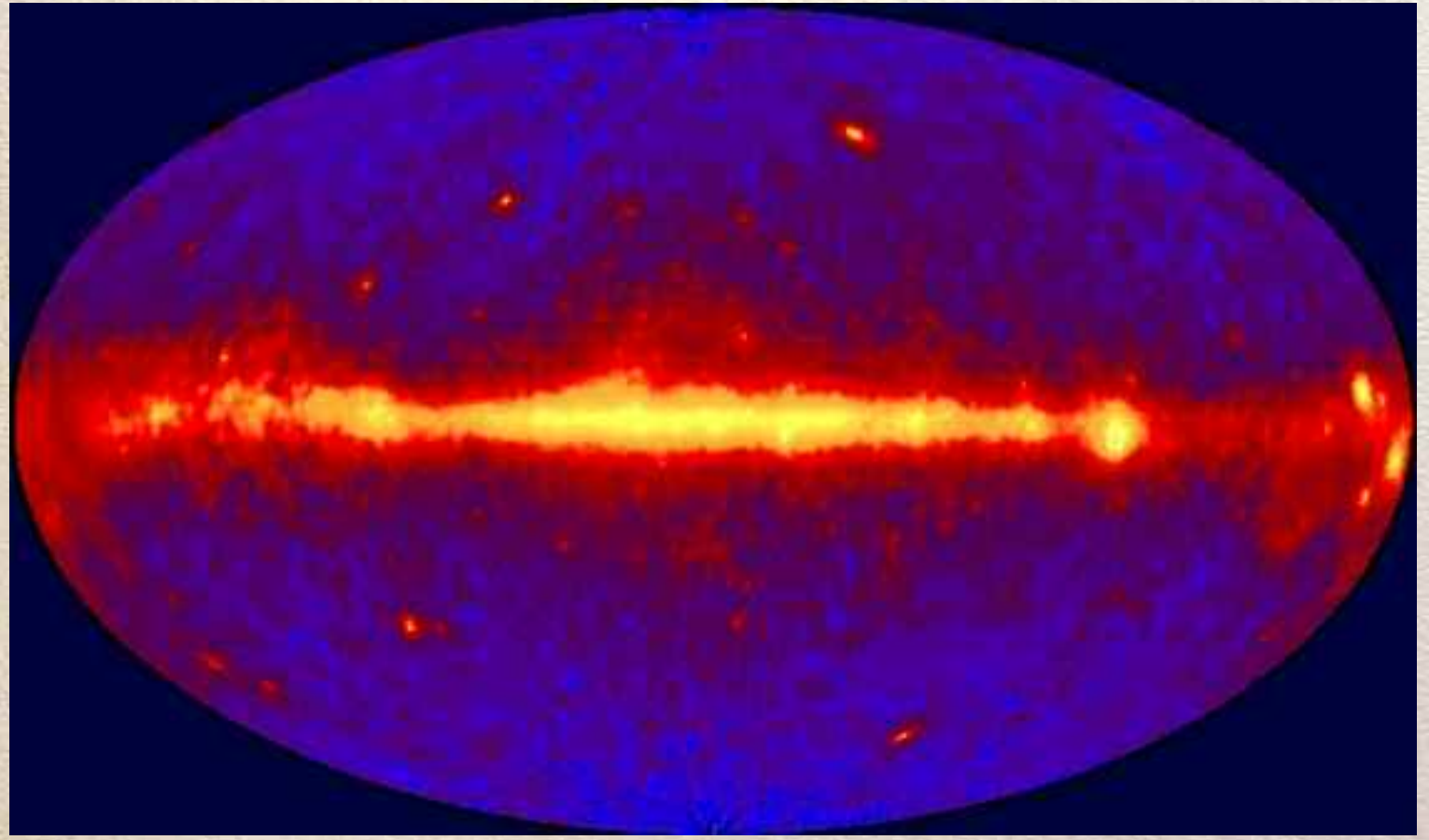
EGRB: how is it measured? what does it look like?



What makes up the EGRB?

- Guaranteed contributions: established classes of gamma-ray emitters
  - ✓ Normal galaxies
  - ✓ Active galaxies
  - ✓ Extragalactic unidentified sources
- Truly diffuse emission?
- Exotic physics?

The Cosmic Star Formation Rate

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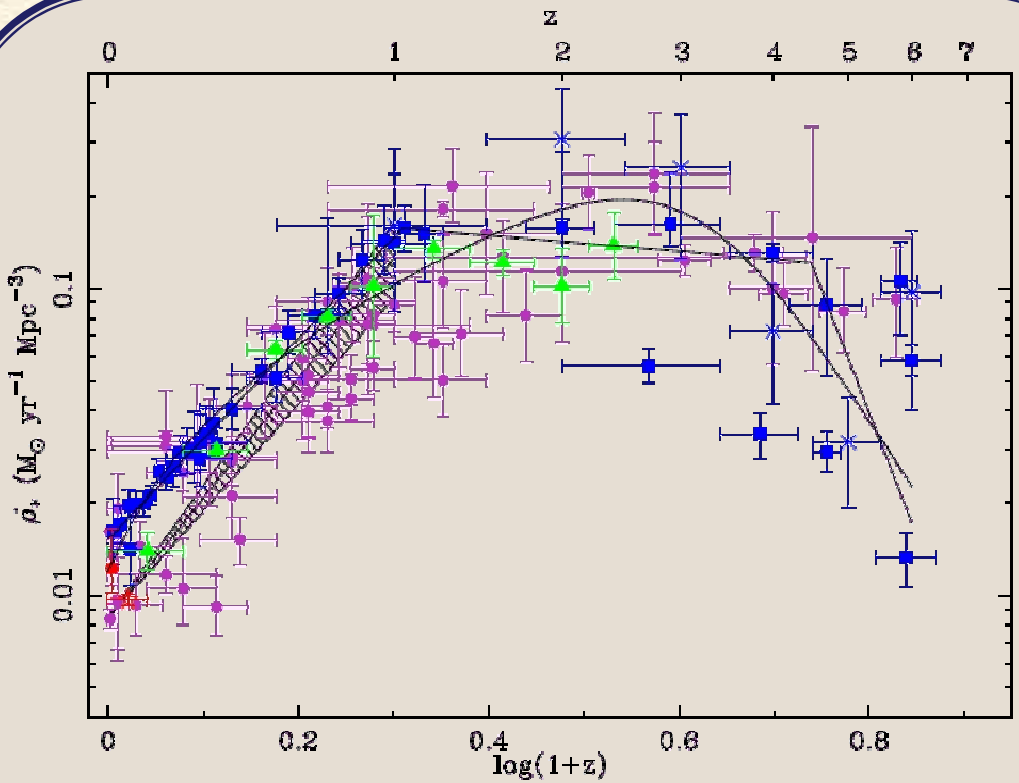

compilation by Hopkins & Beacom 2006

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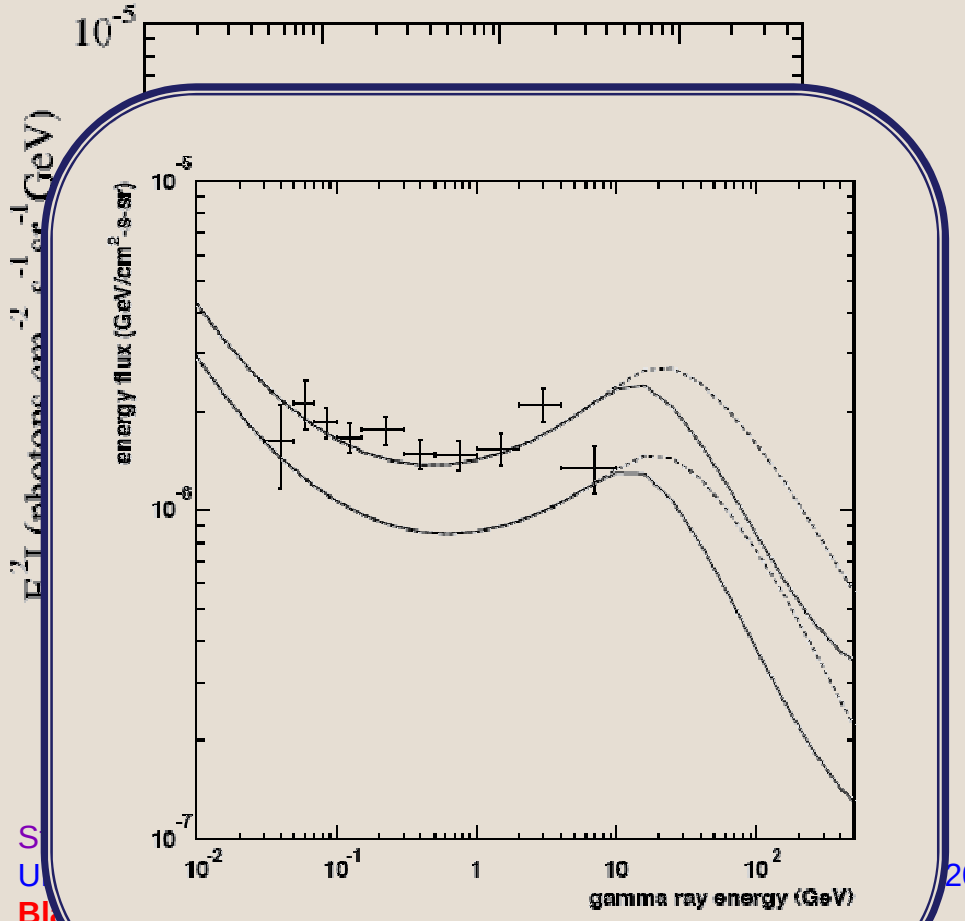
- Star Form… action with gamm…
  - ✓ EBL imp… backgro…



Stecker 1999

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How do we utilize this connection?

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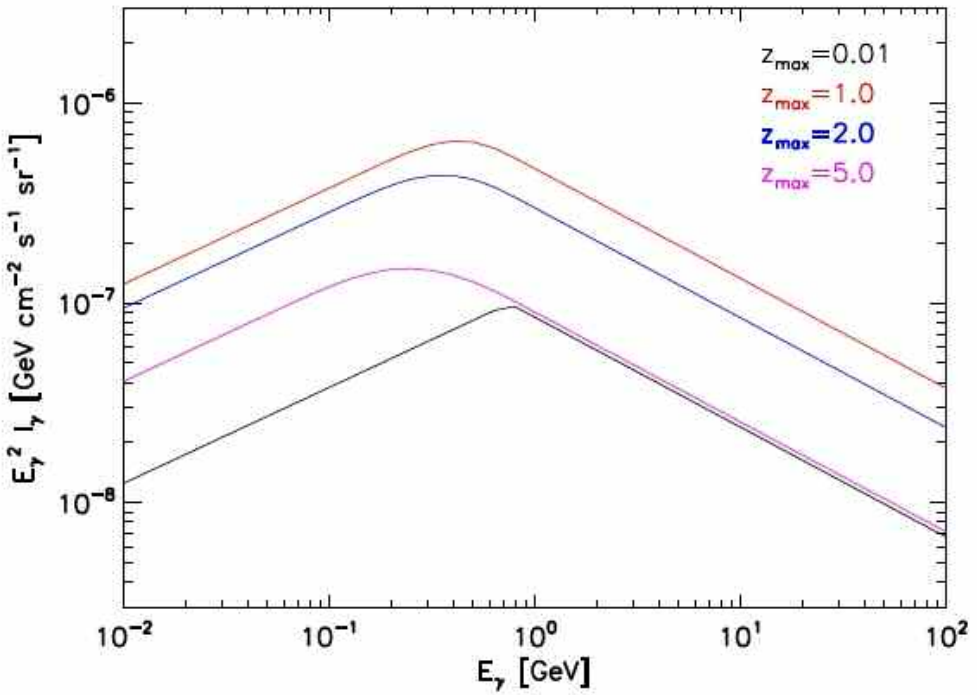

Prodanovic, VP & Fields ***preliminary***

Strigari, Beacom, Walker & Zhang 2005

Conclusions

- Cosmic star formation history imprinted on extragalactic gamma-ray background:
  - ✓ Normal galaxy spectral feature @ ≈ 1GeV
  - ✓ EBL absorption pileup/suppression @ ≥20GeV
- GLAST will:
  - ✓ resolve thousands of bright point sources (e.g. AGNs) but at most 3 normal galaxies -> normal galaxy feature expected to become visible
  - ✓ Probe the >20GeV regime, map the shape of high-E absorption feature
- A new era: observations of the EGRB can strongly constrain the cosmic history of star formation